

Historical biomass, fishing mortality, and recruitment trends of the Campeche Bank red grouper (*Epinephelus morio*)

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Received 12 September 2003; received in revised form 7 September 2004; accepted 7 September 2004

Abstract

This study describes the historical evolution of the biomass, fishing mortality per age group, annual recruitment, and catchability of the Campeche Bank red grouper population. This fishery is based on three fleets (the Mexican Minor, the Mexican Major or Industrial, and the Cuban) with different capacities, areas of operation, and targeting of different age groups. During the last 10 years, the Minor fleet expanded, resulting in some overlapping with the other fleets areas. The biomass of the population of the red grouper in the Campeche Bank has decreased between 1986 and 2000. This decrease is evident from the commercial landings (from 14,410 to 9797 t) and in CPUE from independent research surveys (from 3.8 to 1.5 kg/100 hooks). The size of the spawning stock has decreased 25% since the beginning of the period, as well as the recruitment (from 24 to 11 million, 1–2 years old), while the catchability coefficient has increased (from 0.2 to 0.4).

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Keywords: Red grouper; *Epinephelus*; VPA; Cohort analysis; Gulf of Mexico

1. Introduction

The red grouper (*Epinephelus morio*, Linnaeus, 1928) is one of the most important fisheries in the Campeche Bank area (Fig. 1), with an average annual production (1991–1995) of 11,000 t. Exploitation

is based on three fleets: the Mexican Minor (4981 boats of 10 m length; SEMARNAP, 1998), the Mexican Major or Industrial (564 boats of 12–22 m length; Burgos, 1999; SEMARNAP, 1998), and the Cuban (16 Lambda type boats of 22 m length). Fishing gears are long lines of constructions and sizes dependent on each fleet boat's characteristics. Operation, fishing areas, and catch properties also depend on the fleet's differences: the Mexican Minor fleet operates in relatively shallow waters (less than 30 m) catching young and

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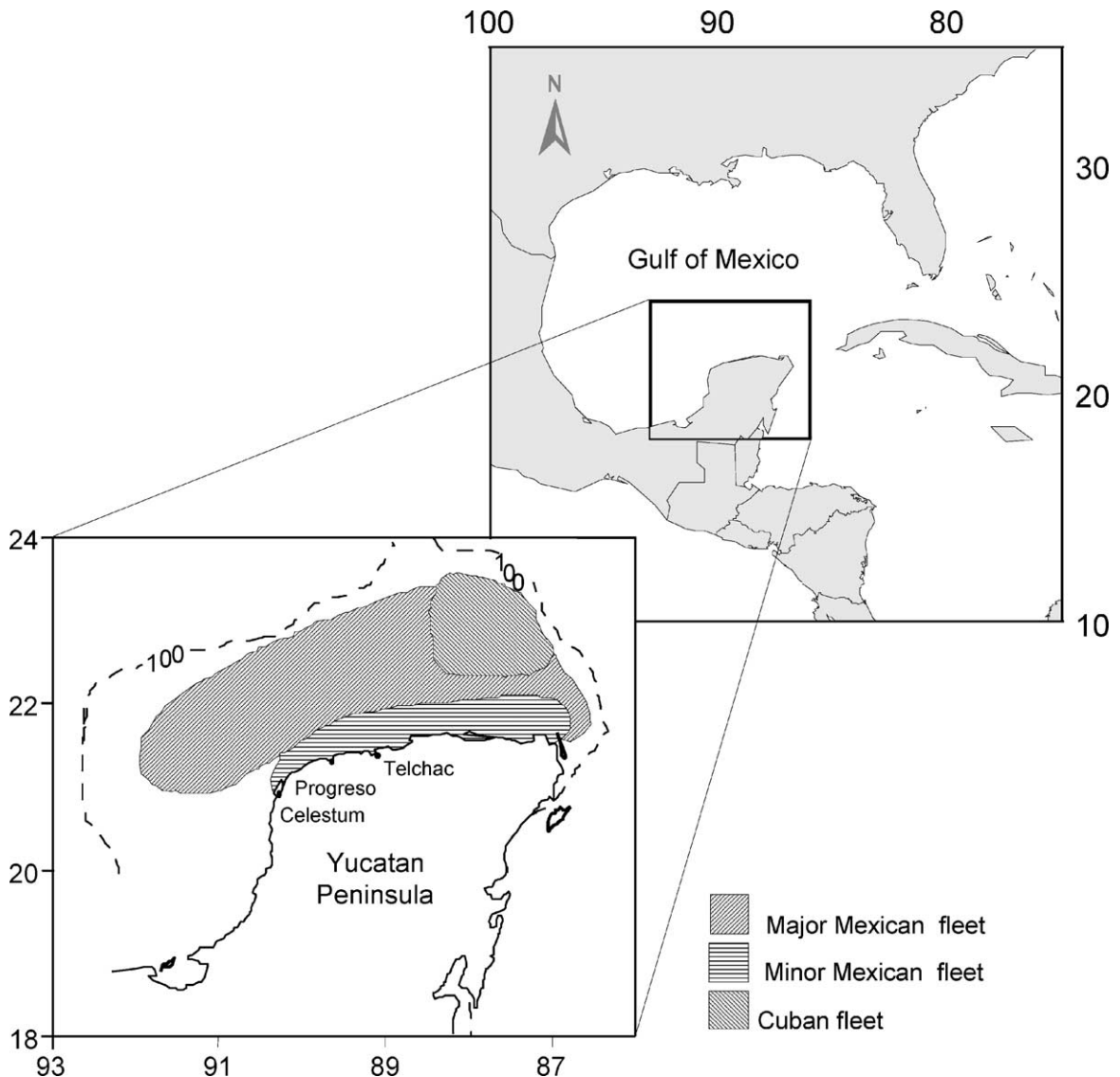


Fig. 1. Location of the Campeche Bank and fishing areas of the three operating fleets.

immature individuals. The Mexican Major and the Cuban fleets operate from 20 and 36 m or deeper, mostly based on mature individuals. During the last 10 years, the Minor fleet expanded, resulting in some overlap with the other fleet's areas. [Mexicano-Cintora \(1990\)](#) noted the Minor fleet from Celestun captures not only young and pre-adults, but some spawned mature fish.

Despite being a multi-specific fishery, red grouper is the main target species, representing 78% of the total

catch for the Mexican Minor fleet, 83% in Mexican Major, and 40% for the Cuban fleet (1995–2000). There is no fisheries management plan, and exploitation regulations are mostly based on a minimum size of 30 cm length ([Burgos, 1999](#)), a free access scheme for the Mexican fleets, and a quota of 850 t for the Cuban fleet during the 2001–2002 season.

Young red groupers in the Campeche Bank inhabit shallow water reefs (15–25 m) and move deeper (>30 m) as they mature. The red grouper is

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